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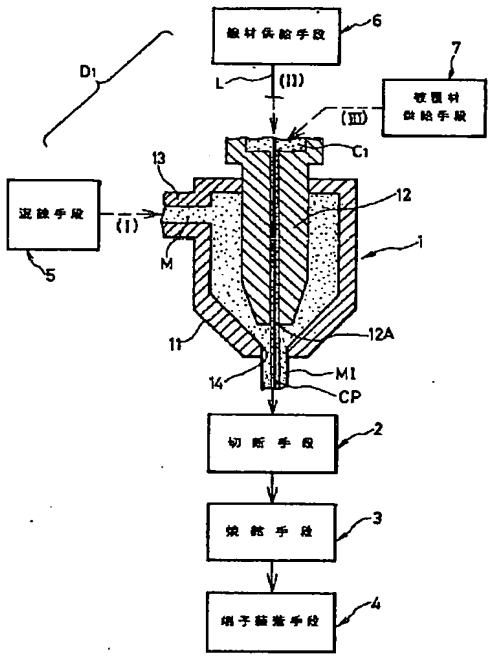
(54)【発明の名称】　インダクタなどの電子部品とその製造方法ならびに製造装置

(57)【要約】

【目的】　磁性材部分に破損を生じさせないように焼結処理できるインダクタとその製法と装置の提供。

【構成】　磁性材料を供給される押出成型手段内に配設した案内筒には、溶解状の被覆材を供給すると共に、導電材を案内筒に挿通させて被覆材によってその外周面を包囲させうるように構成し、押出成型手段の押出口からは、被覆材で包囲された導電材を磁性材料中に埋設した成型体を押出加工しうるように構成し、成型体を少なくとも導電材よりも低く、被覆材よりも高い温度で焼結処理しうるようにしたインダクタなどの製法と装置。



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【特許請求の範囲】

【請求項１】　外周面を、導電材よりも軟化温度が低い被覆材料で包囲した導電材を、フェライトなどの磁性材料内に埋設して焼結処理して形成されるインダクタなどの電子部品。

【請求項２】　前記導電材がＰｔ，Ｐｄ，Ａｕもしくは Ａｇなどによって構成されており、前記被覆材がＰｄ，Ｓｎもしくは、はんだなどの金属材料，ガラス，プラスチックなどの非金属材料で構成されたことを特徴とする請求項１記載のインダクタなどの電子部品。

【請求項３】　前記導電材がＰｔ，ＰｄもしくはＡｕなどによって構成されており、前記被覆材がＡｇによって構成されていることを特徴とする請求項１記載のインダクタなどの電子部品。

【請求項４】　導電材の外周に導電材よりも軟化温度が低い被覆材料で包囲させた後、フェライトなどの磁性材料中にこれを埋設し、次にこれを焼結処理するようにしたインダクタなどの電子部品の製造方法。

【請求項５】　ペースト状のフェライトなどの磁性材料を供給される押出成型手段内に配設した案内筒には、溶解された被覆材を供給すると共に、導電材を当該案内筒に挿通させて前記被覆材によってその外周面を包囲させうるように構成し、押出成型手段の押出口からは、被覆材で包囲された導電材を磁性材料中に埋設した成型体を押出加工しうるように構成し、当該成型体を、少なくとも導電材よりも低く、被覆材よりも高い温度で焼結処理しうるようにしたインダクタなどの電子部品の製造装置。

【請求項６】　前記導電材が複数個並設されるように製造することを特徴とする請求項４記載のインダクタなどの電子部品とその製造方法。

【請求項７】　前記導電材が複数個並設されるように製造することを特徴とする請求項５記載のインダクタなどの電子部品の製造装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】この発明は、電子機器を用いた信号ラインにおいて発生される電磁波障害ノイズを除去するために利用されるインダクタなどの電子部品とその製造方法ならびに製造装置に関するものである。

【０００２】

【従来の技術】従来、この種のノイズ対策用の部品と、その製造方法については以下の通り各種提案されている。

【０００３】その具体例としては、例えば予め白金などの金属線を挿通させた成型金型内に、バインダを混入させたフェライト粉末を充填させて圧縮成型し、焼結することによって、貫通電極を内装したフェライト・ビーズ・インダクタを得る方法（従来技術１）や、もしくは、押出成型金型中に金属線を配置し、この成型金型中に、

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フェライト粉末を樹脂バインダに混練させてなる混練材を供給し、口金部から金属線入りの成型体を押し出し成型し硬化させ、所望の長さ寸法でこれを切断した後焼結処理する方法（従来技術２）などである。

【０００４】前記の如き従来技術に係る製造方法にあっては、いずれもその後工程として、その両端に外部電極を付設してインダクタなどの電子部品として完成させるものである点で共通していることは周知の技術事項であるから、その説明は省略する。

【０００５】

【発明が解決しようとする課題】前記の如き従来技術の製造においても、所要の電子部品は得られるものであるが、前記の各従来技術１，２は、いずれもフェライトとバインダーとの混練材が焼結処理されてフェライト部分が収縮し、その内部の金属線は数％程度膨張する結果、フェライトコアが破損されるおそれが存しており、又フェライトコアの両端から、金属線の外端部が僅かに突出状となる現象が見られ、外部端子の取付け作業の際に、この金属線の突出部を折り曲げ、もしくは切除するなどの付加的な処理工程を必要とするものであった。

【０００６】この発明の目的とするところは、格別の熟練技術を要することなく、迅速且つ大量に高品質のインダクタなどの電子部品と、これを製造することができる優れた製造方法と、その装置を提供することを目的とするものである。

【０００７】

【課題を解決するための手段】前記の目的を達成するためのこの発明の構成上の特徴点は、次の通りである。

【０００８】(1) 外周面を、導電材よりも軟化温度が低い被覆材料で包囲した導電材を、フェライトなどの磁性材料内に埋設して焼結処理して形成されるインダクタなどの電子部品。

【０００９】(2) 前記導電材がＰｔ，Ｐｄ，Ａｕもしくはは Ａｇなどによって構成されており、前記被覆材がＰｄ，Ｓｎもしくは、はんだなどの金属材料，ガラス，プラスチックなどの非金属材料で構成されたことを特徴とする前記(1) 記載のインダクタなどの電子部品。

【００１０】(3) 前記導電材がＰｔ，ＰｄもしくはＡｕなどによって構成されており、前記被覆材がＡｇによって構成されていることを特徴とする前記(1) 記載のインダクタなどの電子部品。

【００１１】(4) 導電材の外周に導電材よりも軟化温度が低い被覆材料で包囲させた後、フェライトなどの磁性材料中にこれを埋設し、次にこれを焼結処理するようにしたインダクタなどの電子部品の製造方法。

【００１２】(5) ペースト状のフェライトなどの磁性材料を供給される押出成型手段内に配設した案内筒には、溶解された被覆材を供給すると共に、導電材を当該案内筒に挿通させて前記被覆材によってその外周面を包囲させうるように構成し、押出成型手段の押出口からは、被

覆材で包囲された導電材を磁性材料中に埋設した成型体を押出加工しうるように構成し、当該成型体を、少なくとも導電材よりも低く、被覆材よりも高い温度で焼結処理しうるようにしたインダクタなどの電子部品の製造装置。

【００１３】(6) 前記導電材が複数個並設されるように製造することを特徴とする前記(4)記載のインダクタなどの電子部品とその製造方法。

【００１４】(7) 前記導電材が複数個並設されるように製造することを特徴とする前記(5)記載のインダクタなどの電子部品の製造装置。

【００１５】

【作　　用】次に、その作用について見れば、導電材の外周を、この導電材よりも低い温度で軟化し、流失もしくは焼失する被覆材で包囲した状態で磁性材料中に埋入し、焼結処理を施し、前記の被覆材を自然的に除去し、磁性材部に裂損もしくは破損が生じないようにして、良質のインダクタを得ることができるものである。

【００１６】

【実　施　例】以下に、この発明の第１の実施例を図面に基づいて説明する。

【００１７】この実施例のものによれば、図２に示すようなＮｉＺｎフェライト材料で構成され、外形寸法が約３．２×１．６×１．１程度の直方体状の中間体（ＭＩ）中に、Ｐｔ，Ｐｄもしくはなどの線材の外周に、厚みが約０．０１５ｍｍ程度にＰｂ，Ｓｎもしくは、はんだなどの被覆材（C_1）を形成し、その直径を０．１ｍｍ程度とした導電材（Ｌ）を埋設した中間体（ＭＩ）を得ることができるものであって、その製造装置（D_1）は、図１に見られるものである。

【００１８】なお、導電材（Ｌ）がＰｔ，Ｐｄもしくはなどである場合には、被覆材（C_1）として、Ａｇの還別も可能である。

【００１９】即ち、この製造装置（D_1）にあっては、押出成型手段（１），切断手段（２），焼結手段（３），および端子装着手段（４）によって構成されている。

【００２０】ところで、前記の押出成型手段（１）について見れば、成型ハウジング（１１）内に導電材の案内筒（１２）を垂設すると共に、注入ポート（１３）からはペースト状の磁性材料（Ｍ）が供給され、押出口（１４）からは中間体（ＭＩ）が押出されるように構成されている。

【００２１】又、前記ハウジング（１１）内に垂設した案内筒（１２）内には、線材供給手段（６）から、１本のＰｔ材などからなる導電材（Ｌ）が供給され、更にこの案内筒（１２）内には、別途被覆材供給手段（７）からＳｎ材などからなる被覆材（C_1）が注入され、前記導電材（Ｌ）を包囲するようになされている。

【００２２】一方、前記案内筒（１２）の導出部（１２Ａ）から、所要の間隔を隔てて成型ハウジング（１１）の押出口（１４）が開設されており、その形状は四辺形状であって、この押出口（１４）からは押出成型されて、中間体（ＭＩ）が押出されるものである（図２参照）。

【００２３】次で、この中間体（ＭＩ）は、切断手段（２）において所定の寸法に横断状に切断され、更に焼結手段（３）において焼結処理され、最後に端子装着手段（４）においてこれに外部電極（ＴＩ）が連設されてインダクタなどの電子部品（ＩＤ）（図４参照）が完成されるような製造ラインが構成されている。

【００２４】次に、この製造装置（D_1）の使用に係る製造方法について見れば、以下の通りである。

【００２５】まず、混練手段（５）において、ＮｉＺｎフェライト粉末と結合樹脂ならびに適宜の溶剤とを十分混練させ、ペースト状の磁性材料（Ｍ）を製造し、これをライン（＝）の経路を通して、注入ポート（１３）から成型ハウジング（１１）内に注入する一方で、ライン（＝）を経由して、線材供給手段（６）から１本のＰｔ材などからなる導電材（Ｌ）を案内筒（１２）内に導入させると共に、ライン（＝）を経由して被覆材供給手段（７）からは、溶解されたＳｎ材などからなる被覆材（C_1）を前記案内筒（１２）内に供給し、導電材（Ｌ）の外周を被覆させるようにする。

【００２６】この状態で、前記の導電材（Ｌ）は案内筒（１２）の下端の導出部（１２Ａ）からハウジング（１１）内に露呈され、その外周を更に磁性材料（Ｍ）によって包囲されてハウジング（１１）の押出口（１４）から押出成型されるが、この加工工程を経た中間体（ＭＩ）は、図２に示す如くに断面長方形状の磁性材料（Ｍ）内に１本の導電材（Ｌ）が被覆材（C_1）によって磁性材料（Ｍ）と隔離された状態で押出成型されたものとなっている。

【００２７】次で、この中間体（ＭＩ）を切断手段（２）において、ナイフなどの適宜の切断具によって所要の長さに切断する。

【００２８】その後、この中間体（ＭＩ）を焼結手段（３）に供給し、例えば約１００℃／ｈの割合で昇温させることにより、磁性材料（Ｍ）を約９００℃程度まで加温し、その後、２００℃／ｈの割合で降温させた結果では、フェライトは約１５％程度収縮し、約８５％程度の寸法の焼結体（ＢＩ）となるが、この際、導電材（Ｚ）を構成するＰｔ，Ｐｄ，ＡｕもしくはＡｇの軟化温度は、それぞれ１７７４℃，１５５５℃，１０６３℃，および９６１℃であるから、膨張および収縮するのみで溶融することはなく、又、被覆材（C_1）を構成するＰｄ，Ｓｎおよびはんだなどは、それぞれ３２７℃，２３２℃，および１８２℃程度で溶融されるので、いずれも流出し、導電材（Ｌ）は、結局直径約０．０８５ｍｍ程度となって磁性材料（Ｍ）中に埋入，定着された状

態となるものである（図３参照）。

【００２９】なお、被覆材（C_1）にＡｇ材を採用した際には、磁性材料（Ｍ）を約１０００℃程度にまで昇降させ、Ａｇ材が軟化するように処理すればよいものである。

【００３０】次に、この焼結中間体（ＭＩ）の両端に端子装着手段（４）においてドリップ手段などにより外部電極（ＴＩ）を付設して、所望のチップインダクタなどの電子部品（ＩＤ）を得ることができるものである（図４参照）。

【００３１】次に、この発明の第２の実施例のインダクタおよびその製造装置（D_2）を図５～図１０に基づいて説明する。

【００３２】この実施例のものは、Ｐｔ材などからなる２本の導電材（L_1）（L_2）をガラス又は、プラスチック材などの被覆材（C_2）で包囲して絶縁状に磁性体内に埋設し、焼結処理を施して、チップインダクタなどを製造するものであって、その製造装置（D_2）は、その大部分が装置（D_1）と共通しているので説明の重複を回避して、その相違する点を中心として以下の通り説明する。

【００３３】即ち、成型手段（１）のハウジング（１１）内に垂設した案内筒（１２）内には、線材供給手段（６'）からＰｔ材などからなる２本の導電材（L_1）（L_2）が互いに所望の間隙を隔てて供給され、更にこの案内筒（１２）内には、別途被覆材供給手段（７'）からガラスもしくはプラスチックなどの被覆材（C_2）が注入され、前記導電材（L_1）（L_2）を包囲するように供給されるものであり、又、前記案内筒（１２）の導出部（１２Ｂ）の形状は、図６にその断面図で示す如くに、アレイ型であって、その中央の連通溝（１２Ｂａ）の両側に導電材（L_1）（L_2）を貫通させる一対の導通孔（１２Ｂｂ）（１２Ｂｂ）が開設された形状となっている。

【００３４】一方、前記案内筒（１２）の導出部（１２Ｂ）から所要の間隔を隔てて成型ハウジング（１１）の押出口（１４）が開設されており、その形状は装置（D_1）の場合と同様であって、図７に示す如くに、四辺形状を呈しており、この押出口（１４）から、図８に示す如き中間体（ＭＩ'）が押出されるものである。

【００３５】尚、この中間体（ＭＩ'）の切断，焼結および外部電極取付けの各処理手段については、第１実施例の装置（D_1）と共通している。

【００３６】次に、この製造装置（D_2）による製造方法の特徴点について見れば、以下の通りである。

【００３７】即ち、ライン（＝）を経由して、線材供給手段（６）から２本のＰｔ材からなる導電材（L_1）（L_2）を、案内筒（１２）内に所要の間隔を隔てて導入させると共に、ライン（＝）を経由して溶解されたガラスもしくはプラスチック材などを前記案内筒（１２）内に供給し、導電材（L_1）（L_2）を被覆させるようにする。

【００３８】この状態で、前記の導電材（L_1）（L_2）は案内筒（１２）の下端の導出部（１２Ｂ）からハウジング（１１）内に露呈され、その外周を更に磁性材料（Ｍ）によって包囲されて、ハウジング（１１）の押出口（１４）から押出成型されるが、この加工工程を経た中間体（ＭＩ'）は、図８に示す如くに、断面長方形状の磁性材料（Ｍ）内に２本の導電材（L_1）（L_2）がそれぞれ被覆材（C_2）によって磁性材料（Ｍ）とは隔離され、しかも前記の被覆材（C_2）間は、断面アレイ型状をなした状態で押出成型されたものとなっている。

【００３９】次で、この中間体（ＭＩ'）を焼結手段（３）に供給し、前記第１の実施例の場合と同様に焼結処理を施すと、被覆材（C_2）であるガラスは溶融して流失し、又、プラスチック材は焼失してしまうため、結局磁性材料（Ｍ）中には図９に示す如くに２本の導電材（L_1）（L_2）が、空隙（Ｇ）を介在させて分離独立して埋設された状態の焼結体（ＢＩ'）状となるものである。

【００４０】しかして、最後に前記焼結体（ＢＩ'）の両端に図１０に示すようにそれぞれ外部電極（ＴＩ'）を付設すると共に、その中間部を絶縁状に分離させて、所望のインダクタなどの電子部品（ＩＤ'）を得ることが出来るものである。

【００４１】なお、材１および第２の実施例においては、いずれも被覆材料（C_1），（C_2）によって導電材（Ｌ），（L_1），（L_2）の外周を被覆処理した直後に、これを磁性材料（Ｍ）内に埋設して押出成型処理するものであるが、別途、予め被覆材料により、被覆処理済みの導電材を押出成型手段に供給して磁性材料中に被覆材料で被覆された導電材を埋設した中間体を成型する方法も、この発明の他の実施例であることは当然のことである。

【００４２】

【発明の効果】以上の通り、この発明によれば、軟化温度が比較的に低い被覆材料によって被覆された導電材を磁性材料中に埋入させて焼結処理を施して、電子部品を製造するものであるから、焼結処理の際に磁性材料が収縮しても、その内部の被覆材料は軟化して流失もしくは焼失してしまうために、磁性材料にストレスが付与されて、これが破損されるおそれがないため、高品質のインダクタなどの電子部品が得られるものである。

【図面の簡単な説明】

【図１】この発明に係る製造装置の第１の実施例を示すブロック説明図。

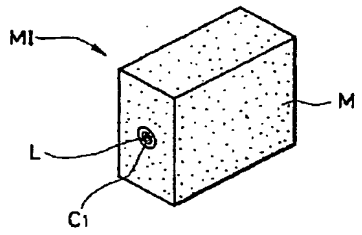
【図２】図１によって得られた中間体の斜視図。

【図３】図２の中間体を焼結処理してなる焼結体の斜視図。

7　　8

【図４】図１の装置によって完成されたインダクタの斜視図。
【図５】この発明に係る製造装置の第２の実施例を示すブロック説明図。
【図６】図５のＸ－Ｘ位置における案内筒の断面図。
【図７】図５のＹ－Ｙ断面図。
【図８】図５によって得られた中間体の斜視図。
【図９】図８の中間体を焼結処理してなる焼結体の斜視図。
【図１０】図５の装置によって完成されたインダクタの斜視図。
【符号の説明】
D_1,D_2　製造装置
＊１　押出成型手段
１１　ハウジング
１２　案内筒
１２Ａ，１２Ｂ　導出部
１４　押出口
２　切断手段
３　焼結手段
Ｍ　磁性材料
Ｌ，L_1,L_2　導電材
C_1,C_2　被覆材料
ＭＩ，ＭＩ'　中間体
ＢＩ，ＢＩ'　焼結体
ＩＤ，ＩＤ'　電子部品

【図２】



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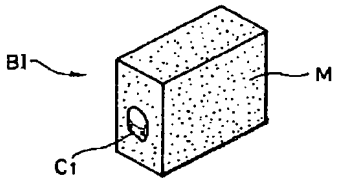

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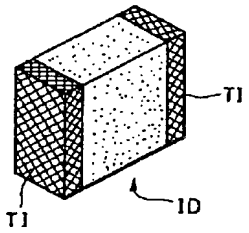

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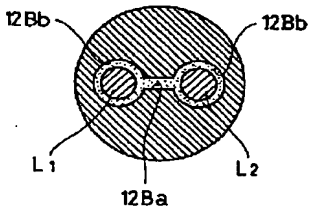

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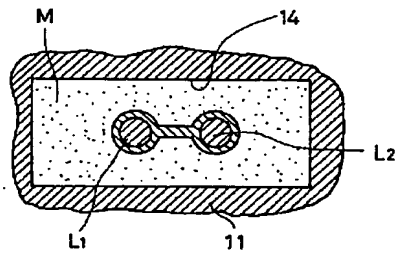

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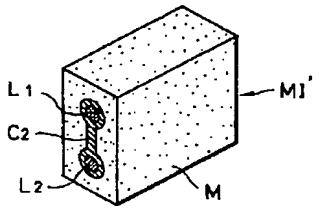

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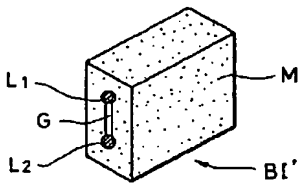
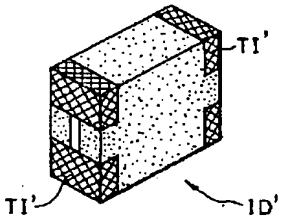
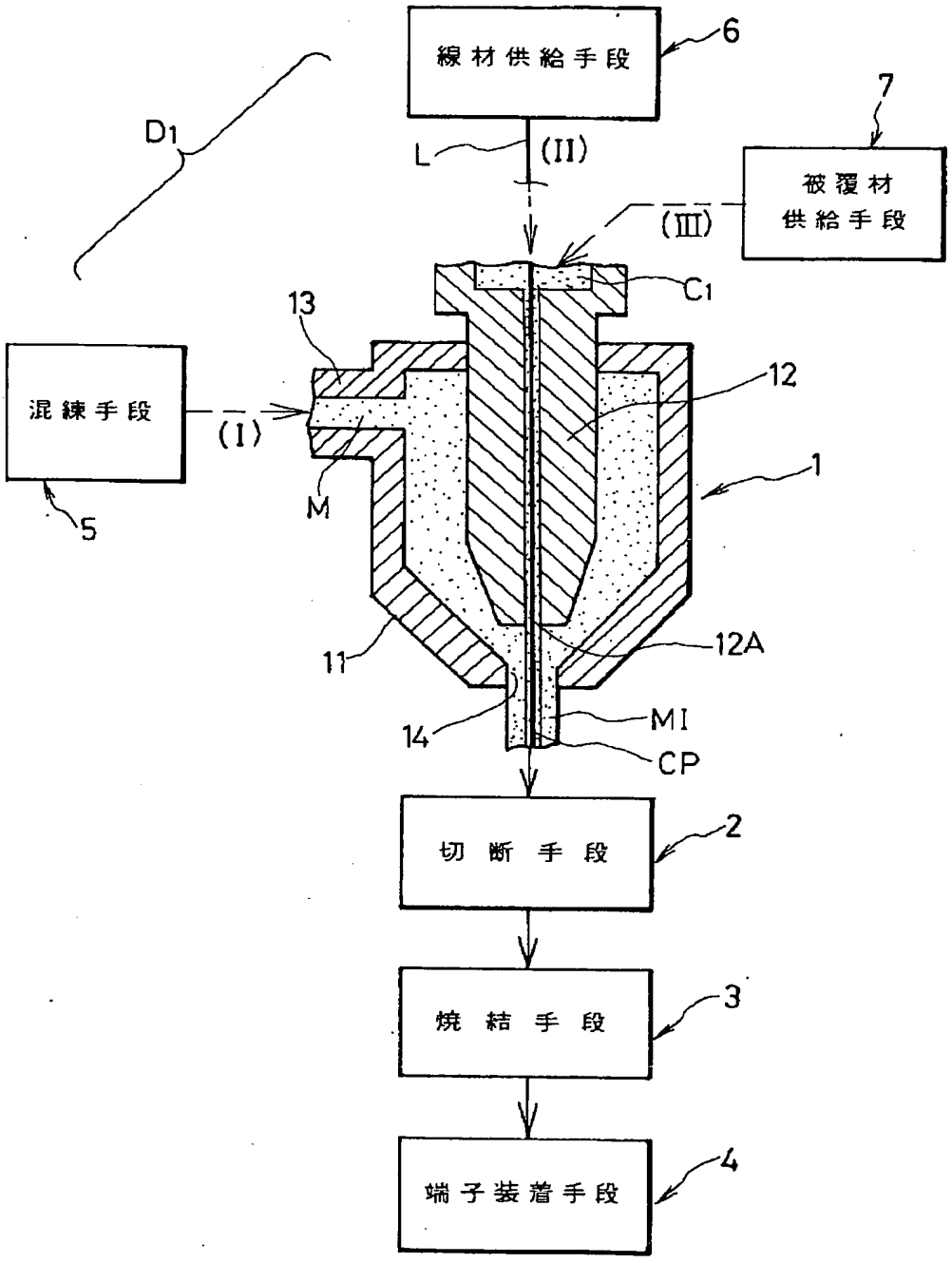


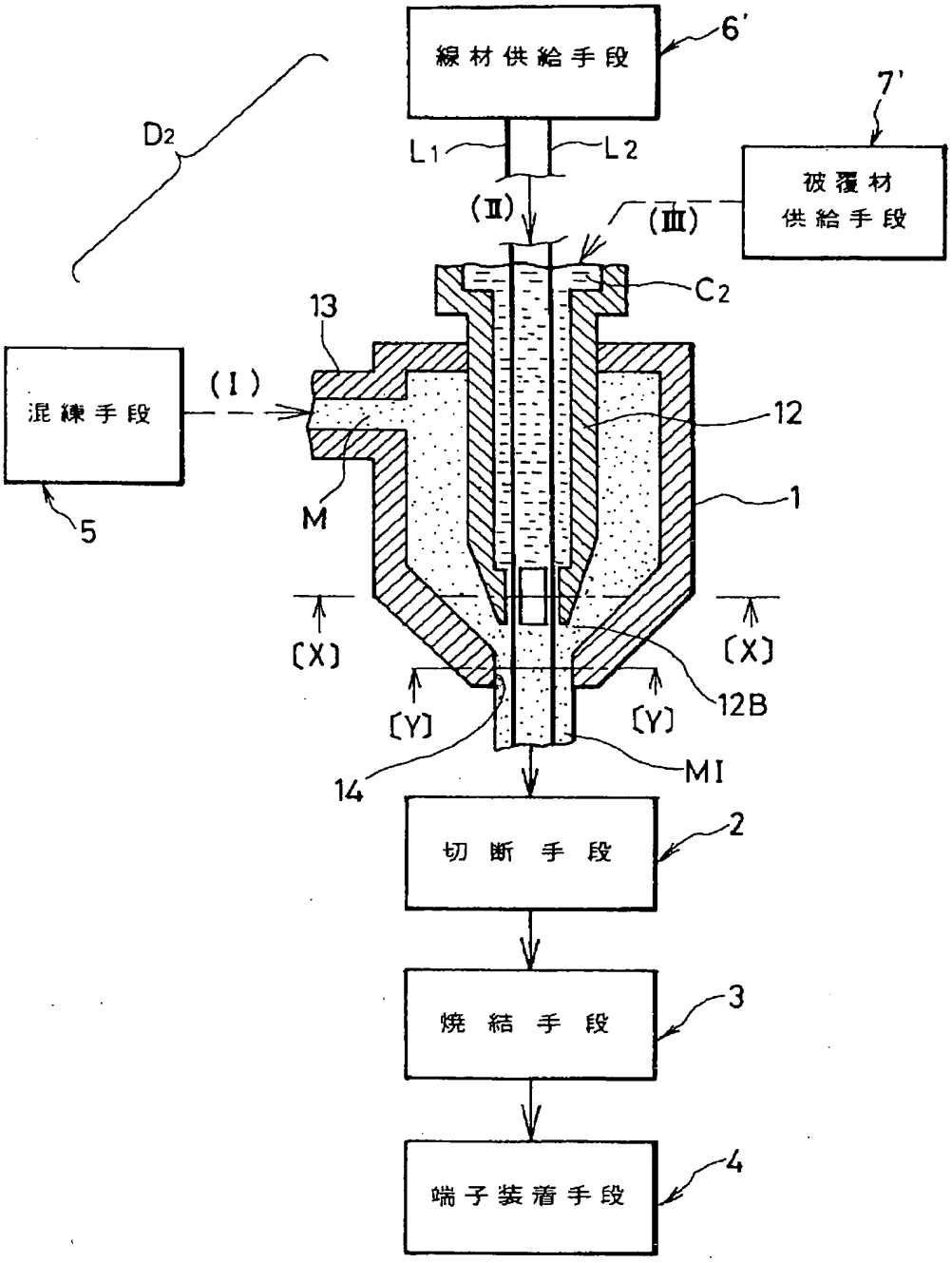
【図１０】



【図1】


線材供給手段
6
7
D1
L
(II)
被覆材
供給手段
(III)
C1
13
混練手段
(I)
12
1
M
5
11
12A
14
MI
CP
切断手段
2
焼結手段
3
端子装着手段
4

【図5】


線材供給手段
6'
7'
D2
L1
L2
(II)
(III)
被覆材
供給手段
C2
13
混練手段
(I)
12
M
1
5
〔X〕
〔X〕
12B
〔Y〕
〔Y〕
14
MI
切断手段
2
焼結手段
3
端子装着手段
4

Bibliography

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[Translation done.]

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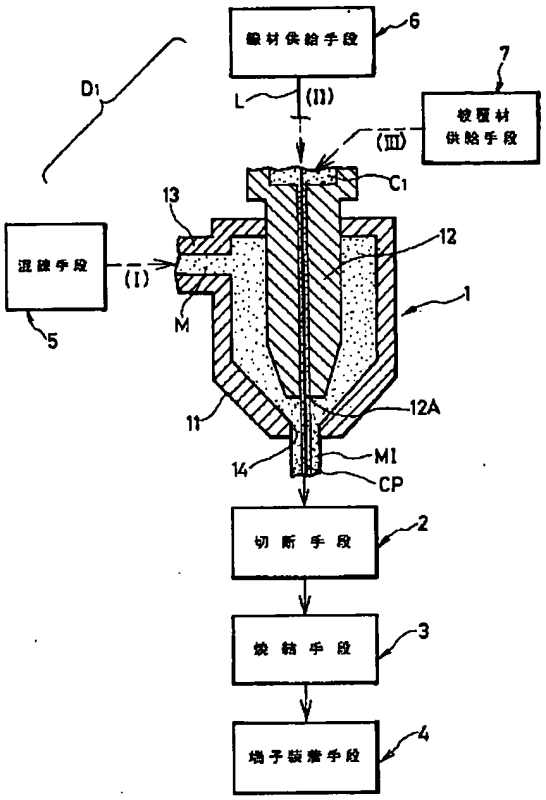
Epitome

(57) [Abstract]
[Objects of the Invention] The offer of the inductor which can carry out sintering processing so that a magnetic material part may not be made to produce breakage, a process, and equipment.
[Elements of the Invention] In the guidance cylinder arranged in an extrusion molding means by which a magnetic material is supplied While supplying the cladding material of the letter of the dissolution, electric conduction material is made to insert in a guidance cylinder, and it constitutes so that the peripheral face may be made to surround and it may get with a cladding material. From extrusion opening of an extrusion molding means A process and equipments, such as an inductor which constituted so that extrusion of the molding object which laid underground the electric conduction material surrounded with the cladding material into the magnetic material could be carried out, is lower than electric conduction material at least, and enabled it to carry out sintering processing of the molding object at temperature higher than a cladding material.

[Translation done.]



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CLAIMS

[Claim(s)]

[Claim 1] Electronic parts, such as an inductor formed by laying underground the electric conduction material which surrounded the peripheral face with covering material with softening temperature lower than electric conduction material in magnetic materials, such as a ferrite, and carrying out sintering processing.

[Claim 2] Electronic parts, such as an inductor according to claim 1 characterized by for said electric conduction material being constituted by Pt, Pd, Au, or Ag, and said cladding material consisting of nonmetal materials, such as metallic materials, such as Pd, Sn, or solder, glass, and plastics.
[Claim 3] Electronic parts, such as an inductor according to claim 1 characterized by for said electric conduction material being constituted by Pt, Pd, or Au, and said cladding material being constituted by Ag.
[Claim 4] The manufacture approach of electronic parts, such as an inductor which lays this underground into magnetic materials, such as a ferrite, and then was made to carry out sintering processing of this after making the periphery of electric conduction material surround with covering material with softening temperature lower than electric conduction material.
[Claim 5] In the guidance cylinder arranged in an extrusion molding means by which magnetic materials, such as a paste-like ferrite, are supplied While supplying the dissolved cladding material, electric conduction material is made to insert in the guidance cylinder concerned, and it constitutes so that the peripheral face may be made to surround and it may get with said cladding material. From extrusion opening of an extrusion molding means The manufacturing installation of electronic parts, such as an inductor which constituted so that extrusion of the molding object which laid underground the electric conduction material surrounded with the cladding material into the magnetic material could be carried out, is lower than electric conduction material at least, and enabled it to carry out sintering processing of the molding object concerned at temperature higher than a cladding material.
[Claim 6] Electronic parts and its manufacture approaches, such as an inductor according to claim 4 characterized by manufacturing so that two or more said electric conduction material may be installed.
[Claim 7] The manufacturing installation of electronic parts, such as an inductor according to claim 5 characterized by manufacturing so that two or more said electric conduction material may be installed.

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2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to electronic parts, its manufacture approach, and manufacturing installations, such as an inductor used in order to remove the electromagnetic-wave-disorder noise generated in the signal line which used electronic equipment.
[0002]
[Description of the Prior Art] Conventionally, about the component and its manufacture approach for this kind of cure against a noise, various proposals are made as follows.
[0003] By making it filled up with the ferrite powder which made the binder mix as the example in the molding metal mold in which metal wires, such as platinum, were made to insert beforehand for example, carrying out compression molding, and sintering the approach (conventional technique 1) of obtaining the ferrite bead inductor which carried out the interior of the penetration electrode -- or the kneading material which a metal wire is arranged [material] in extrusion molding metal mold, and makes a resin binder come to knead ferrite powder in this molding metal mold -- supplying -- a mouthpiece -- after extruding, casting and stiffening the molding object containing a metal wire from the section and cutting this with a desired die-length dimension, it is the approach (conventional technique 2) of carrying out sintering processing etc.
[0004] If it is in the manufacture approach concerning the conventional technique like the above, since it is all a well-known technical matter that it is common at the point which is the thing which you attach [thing] an external electrode to the both ends as a process, and makes it complete as electronic parts, such as an inductor, after that, the explanation is omitted.
[0005]
[Problem(s) to be Solved by the Invention] Also in manufacture of the conventional technique like the above, although necessary electronic parts are obtained Since each above **, sintering processing of the

kneading material of a ferrite and a binder is carried out by each, and the ferrite part has contracted techniques 1 and 2. As a result of the metal wire of the interior expanding about several%, a possibility that a ferrite core may be damaged consists. Moreover, it was what needs additional down stream processing of the phenomenon in which the heel of a metal wire serves as a letter of a protrusion slightly being seen from the both ends of a ferrite core, bending the lobe of this metal wire in case it is anchoring of an external terminal, or excising.

[0006] The place made into the purpose of this invention aims at offering that equipment to electronic parts, such as an inductor of high quality, and the outstanding manufacture approach which can manufacture this quickly and in large quantities, without requiring the skillful technique according to rank.

[0007]

[Means for Solving the Problem] The focus on the configuration of this invention for attaining the aforementioned purpose is as follows.

[0008] (1) Electronic parts, such as an inductor formed by laying underground the electric conduction material which surrounded the peripheral face with covering material with softening temperature lower than electric conduction material in magnetic materials, such as a ferrite, and carrying out sintering processing.

[0009] (2) The above characterized by for said electric conduction material being constituted by Pt, Pd, Au, or Ag, and said cladding material consisting of nonmetal materials, such as metallic materials, such as Pd, Sn, or solder, glass, and plastics, (1) Electronic parts, such as an inductor of a publication.

[0010] (3) The above characterized by for said electric conduction material being constituted by Pt, Pd, or Au, and said cladding material being constituted by Ag (1) Electronic parts, such as an inductor of a publication.

[0011] (4) The manufacture approach of electronic parts, such as an inductor which lays this underground into magnetic materials, such as a ferrite, and then was made to carry out sintering processing of this after making the periphery of electric conduction material surround with covering material with softening temperature lower than electric conduction material.

[0012] (5) In the guidance cylinder arranged in an extrusion molding means by which magnetic materials, such as a paste-like ferrite, are supplied While supplying the dissolved cladding material, electric conduction material is made to insert in the guidance cylinder concerned, and it constitutes so that the peripheral face may be made to surround

and it may get with said cladding material. From extrusion opening of an extrusion molding means The manufacturing installation of electronic parts, such as an inductor which constituted so that extrusion of the molding object which laid underground the electric conduction material surrounded with the cladding material into the magnetic material could be carried out, is lower than electric conduction material at least, and enabled it to carry out sintering processing of the molding object concerned at temperature higher than a cladding material.

[0013] (6) The electronic parts and its manufacture approaches of the aforementioned (4) publication characterized by manufacturing so that two or more said electric conduction material may be installed, such as an inductor.

[0014] (7) The manufacturing installation of electronic parts, such as an inductor of the aforementioned (5) publication characterized by manufacturing so that two or more said electric conduction material may be installed.

[0015]

[work --] for Next, if it sees about that operation, a good inductor can be obtained, as the periphery of electric conduction material is softened at temperature lower than this electric conduction material, embed into a magnetic material in the condition of having surrounded with the cladding material spilt out or burned down, sintering processing is performed, the aforementioned cladding material is removed naturally and **** or breakage does not arise in the magnetic material section.

[0016]

[The example of fruit **] Below, the 1st example of this invention is explained based on a drawing.

[0017] According to the thing of this example, it consists of NiZn ferrite ingredients as shown in drawing 2 . the inside of the intermediate field (MI) of the shape of a rectangular parallelepiped whose dimension is about about 3.2x1.6x1.1 -- the periphery of wire rods, such as Pt, Pd, or Au, -- thickness -- about 0.015mm -- Pb and Sn -- or Cladding materials (C1), such as solder material, can be formed, the intermediate field (MI) which laid underground the electric conduction material (L) which set the diameter to about 0.1mm can be obtained, and the manufacturing installation (D1) is looked at by drawing 1 .

[0018] In addition, when electric conduction material (L) is Pt, Pd, or Au, sorting of Ag is also possible as a cladding material (C1).

[0019] That is, it is constituted by the extrusion molding means (1), the cutting means (2), the sintering means (3), and the terminal wearing

means (4) if it is in this manufacturing installation (D1).
[0020] By the way, if it sees about the aforementioned extrusion molding means (1), while installing the guidance cylinder (12) of electric conduction material in molding housing (11), a paste-like magnetic material (M) is supplied from an impregnation port (13), and it consists of extrusion openings (14) so that intermediate field (MI) may be extruded.
[0021] Moreover, in the guidance cylinder (12) installed in said housing (11), the electric conduction material (L) which consists of one Pt material etc. is supplied from a wire rod supply means (6), the cladding material (C1) which consists of Sn material etc. is further poured in from a cladding material supply means (7) separately into this guidance cylinder (12), and it is made as [surround / said electric conduction material (L)].
[0022] On the other hand, from the derivation section (12A) of said guidance cylinder (12), necessary spacing is separated, extrusion opening (14) of molding housing (11) is established, that configuration is a quadrilateral-like, from this extrusion opening (14), extrusion molding is carried out and intermediate field (MI) are extruded (refer to drawing 2).
[0023] Next, this intermediate field (MI) are cut by the predetermined dimension in the shape of crossing in a cutting means (2), sintering processing is further carried out in a sintering means (3), and a production line with which external electrodes (TI) are formed successively by setting for a terminal wearing means (4) finally, and electronic parts (ID), such as an inductor, and (referring to drawing 4) are completed is constituted.
[0024] Next, it will be as follows if it sees about the manufacture approach concerning use of this manufacturing installation (D1).
[0025] First, in a kneading means (5), make NiZn ferrite powder, joint resin, and a proper solvent knead enough, manufacture a paste-like magnetic material (M), and it lets the path of Rhine (=) pass for this. While pouring in into molding housing (11) from an impregnation port (13) While making the electric conduction material (L) which consists of one Pt material etc. introduce in a guidance cylinder (12) from a wire rod supply means (6) via Rhine (=) The cladding material (C1) which consists of dissolved Sn material is supplied in said guidance cylinder (12), and it is made to make the periphery of electric conduction material (L) cover from a cladding material supply means (7) via Rhine (=).
[0026] Although the aforementioned electric conduction material (L) is

exposed in housing (11) from the derivation section (12A) of the lower limit of a guidance cylinder (12), that periphery is further surrounded with a magnetic material (M) and extrusion molding is carried out from extrusion opening (14) of housing (11) in this condition The intermediate field (MI) which passed through this processing process had carried out extrusion molding, where one electric conduction material (L) is isolated with a magnetic material (M) by the cladding material (C1) in a cross-section rectangle-like magnetic material (M), as shown in drawing 2 .

[0027] Next, in a cutting means (2), proper cutting implements, such as a knife, cut this intermediate field (MI) to necessary die length.

[0028] Then, by supplying this intermediate field (MI) to a sintering means (3), for example, carrying out a temperature up at a rate of about 100 degrees C/h Although a magnetic material (M) is warmed to about 900 degrees C, a ferrite is contracted about 15% after that by the result made to lower at a rate of 200 degrees C/h and it becomes the sintering object (BI) of about 85% of dimension Under the present circumstances, the softening temperature of Pt, Pd and Au which constitute electric conduction material (Z), or Ag Since it is 1774 degrees C, 1555 degrees C, 1063 degrees C, and 961 degrees C, respectively Pd, Sn, solder, etc. which do not fuse only by expanding and contracting and constitute a cladding material (C1) Since melting is carried out at 327 degrees C, 232 degrees C, and about 182 degrees C, respectively, it will be in the condition of all having flowed out and electric conduction material (L) having become the diameter of about 0.085mm after all, and it having been embedded into the magnetic material (M) and having been established (refer to drawing 3).

[0029] In addition, what is necessary is to make about 1000 degrees C go up and down a magnetic material (M), and just to process so that Ag material may soften when Ag material is adopted as a cladding material (C1).

[0030] Next, in a terminal wearing means (4), a drip means etc. can attach an external electrode (TI) to the both ends of this sintering intermediate field (MI), and electronic parts (ID), such as a desired chip inductor, can be obtained (refer to drawing 4).

[0031] Next, the inductor of the 2nd example of this invention and its manufacturing installation (D2) are explained based on drawing 5 - drawing 10 .

[0032] The thing of this example two electric conduction material (L1) (L2) which consists of Pt material etc. Glass Or surround with cladding materials (C2), such as plastics material, lay underground in the

magnetic substance at a letter breaking off the relation, and sintering processing is performed. Manufacturing a chip inductor etc., since the most is common to equipment (D1), the manufacturing installation (D2) avoids duplication of explanation, and it explains focusing on the different point as follows.

[0033] namely, in the guidance cylinder (12) installed in housing (11) of a molding means (1) From a wire rod supply means (6'), two electric conduction material (L1) (L2) which consists of Pt material etc. separates a desired gap mutually, and is supplied. Further in this guidance cylinder (12) Cladding materials (C2), such as glass or plastics, are separately poured in from a cladding material supply means (7'). It is what is supplied so that said electric conduction material (L1) (L2) may be surrounded. Moreover, the configuration of the derivation section (12B) of said guidance cylinder (12) As shown to drawing 6 in the sectional view, it is an array mold and has become the configuration in which the flow hole (12Bb) (12Bb) of the pair which makes the both sides of the free passage slot (12Ba) of the center penetrate electric conduction material (L1) (L2) was established.

[0034] As necessary spacing is separated from the derivation section (12B) of said guidance cylinder (12), and extrusion opening (14) of molding housing (11) is established on the other hand, and that configuration is the same as that of the case of equipment (D1) and it is shown in drawing 7 , the shape of a quadrilateral is presented and the **** intermediate field (MI') shown in drawing 8 are extruded from this extrusion opening (14).

[0035] In addition, about each processing means of cutting of this intermediate field (MI'), sintering, and external electrode anchoring, it is common to the equipment (D1) of the 1st example.

[0036] Next, it will be as follows if it sees about the focus of the manufacture approach by this manufacturing installation (D2).

[0037] Namely, while separating the electric conduction material (L1) (L2) which consists of a wire rod supply means (6) to two Pt material in a guidance cylinder (12) via Rhine (=) and making necessary spacing introduce Glass or plastics material dissolved via Rhine (=) is supplied in said guidance cylinder (12), and it is made to make electric conduction material (L1) (L2) cover.

[0038] Although the aforementioned electric conduction material (L1) (L2) is exposed in housing (11) from the derivation section (12B) of the lower limit of a guidance cylinder (12), that periphery is further surrounded with a magnetic material (M) and extrusion molding is carried out from extrusion opening (14) of housing (11) in this condition As the

intermediate field (MI') which passed through this processing process are shown in drawing 8 , two electric conduction material (L1) (L2) is isolated with a magnetic material (M) by the cladding material (C2) in a cross-section rectangle-like magnetic material (M), respectively. And between the aforementioned cladding materials (C2), where the shape of a cross-section array mold is made, extrusion molding had been carried out.

[0039] If this intermediate field (MI') are supplied to a sintering means (3) and sintering processing is performed like the case of said 1st example next, since the glass which is a cladding material (C2) will be fused, and will be spilt out and plastics material will be burned down, After all, into a magnetic material (M), as shown in drawing 9 , two electric conduction material (L1) (L2) makes an opening (G) intervene, and serves as the shape of a sintering object in the condition of having been gained separate independence and laid underground (BI').

[0040] A deer is carried out, each, as finally shown in the both ends of said sintering object (BI') at drawing 10 , while attaching an external electrode (TI'), the pars intermedia can be made to be able to divide into a letter breaking off the relation, and electronic parts (ID'), such as a desired inductor, can be obtained.

[0041] In addition, although this is laid underground in a magnetic material (M) and extrusion molding processing is carried out in ** 1 and the 2nd example immediately after each carries out covering processing of the periphery of electric conduction material (L), (L1), and (L2) by covering material (C1) and (C2) It stands to reason that the approaches of casting the intermediate field which laid underground the electric conduction material which supplied electric conduction material [finishing / covering processing] to the extrusion molding means, and was separately covered with covering material by covering material in the magnetic material beforehand are also other examples of this invention.

[0042]

[Effect of the Invention] Since according to this invention the above passage the electric conduction material covered with covering material with softening temperature low in comparison is made to embed into a magnetic material, sintering processing is performed and electronic parts are manufactured, even if a magnetic material contracts in the case of sintering processing Since it softens and the covering material of the interior is spilt out or burned down, stress is given to a magnetic material, and since there is no possibility that this may be

damaged, electronic parts, such as an inductor of high quality, are obtained.

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block explanatory view showing the 1st example of the manufacturing installation concerning this invention.
[Drawing 2] The perspective view of the intermediate field obtained by drawing 1 .
[Drawing 3] The perspective view of the sintering object which comes to carry out sintering processing of the intermediate field of drawing 2 .
[Drawing 4] The perspective view of the inductor completed by the equipment of drawing 1 .
[Drawing 5] The block explanatory view showing the 2nd example of the manufacturing installation concerning this invention.
[Drawing 6] The sectional view of the guidance cylinder in the X-X location of drawing 5 .
[Drawing 7] The Y-Y sectional view of drawing 5 .
[Drawing 8] The perspective view of the intermediate field obtained by drawing 5 .
[Drawing 9] The perspective view of the sintering object which comes to carry out sintering processing of the intermediate field of drawing 8 .
[Drawing 10] The perspective view of the inductor completed by the equipment of drawing 5 .
[Description of Notations]
D1, D2 Manufacturing installation
1 Extrusion Molding Means
11 Housing

12 Guidance Cylinder
12A, 12B Derivation section
14 Extrusion Opening
2 Cutting Means
3 Sintering Means
M Magnetic material
L, L1, L2 Electric conduction material
C1, C2 Covering material
MI, MI' Intermediate field
BI, BI' Sintering object
ID, ID' Electronic parts

[Translation done.]

* NOTICES *

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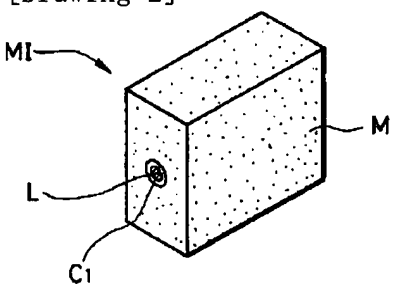
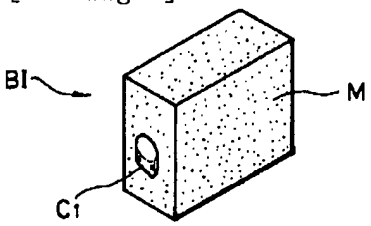
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

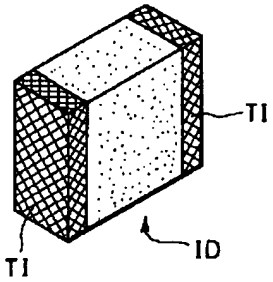
[Drawing 2]



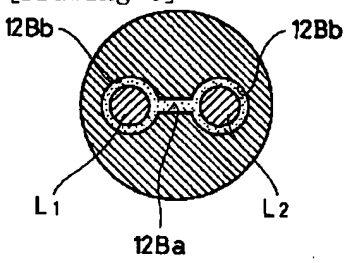
[Drawing 3]



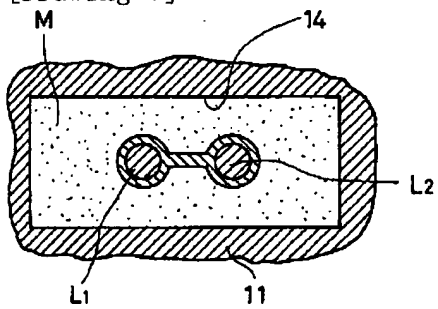
[Drawing 4]



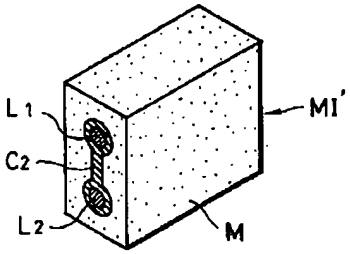
[Drawing 6]



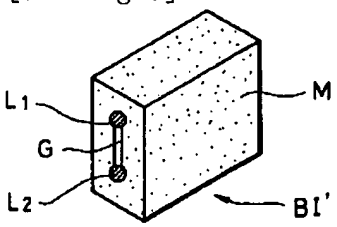
[Drawing 7]



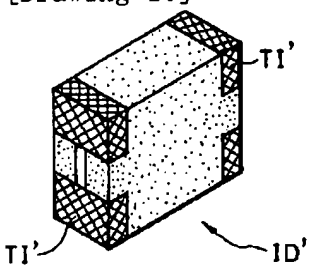
[Drawing 8]



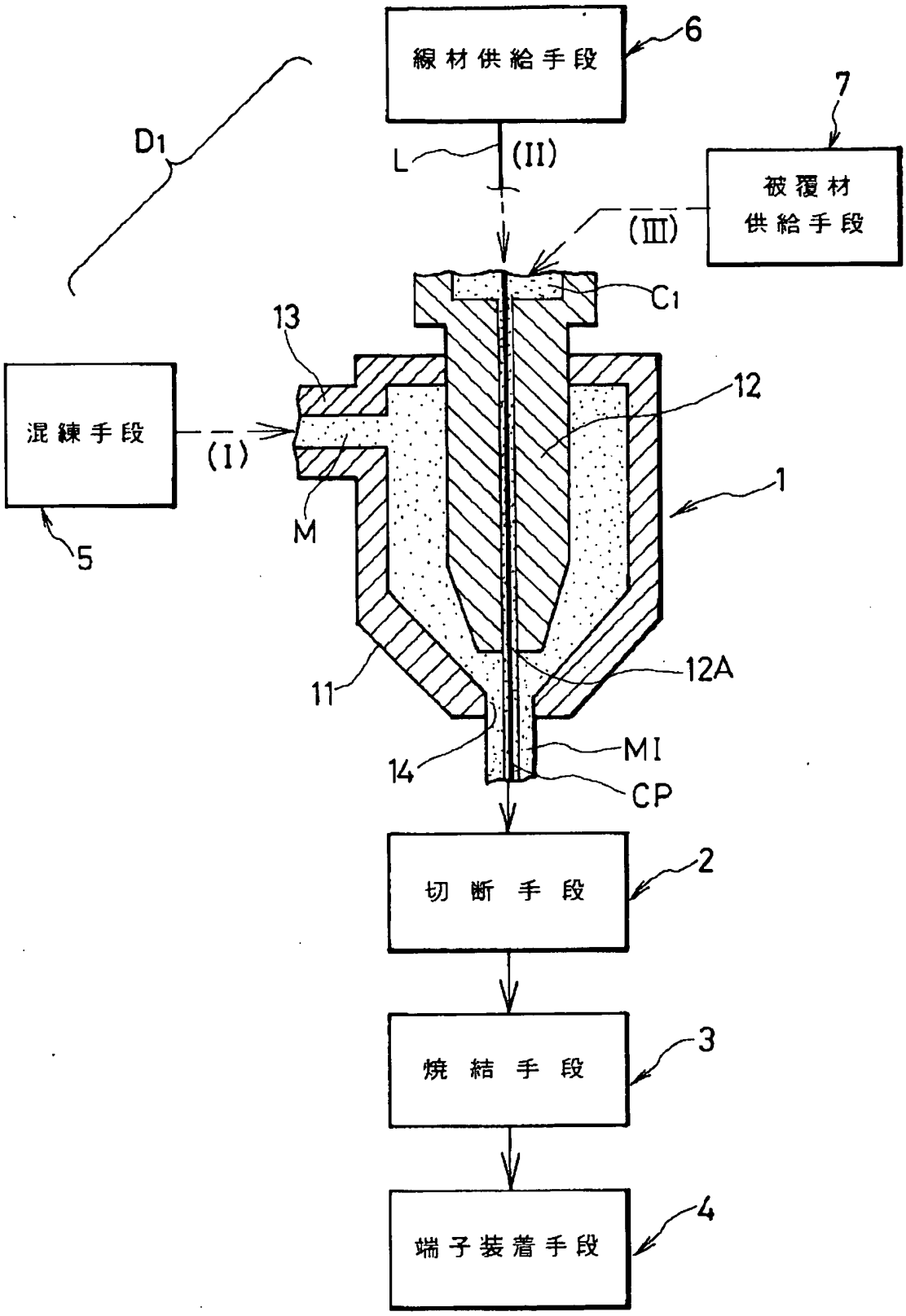
[Drawing 9]



[Drawing 10]



[Drawing 1]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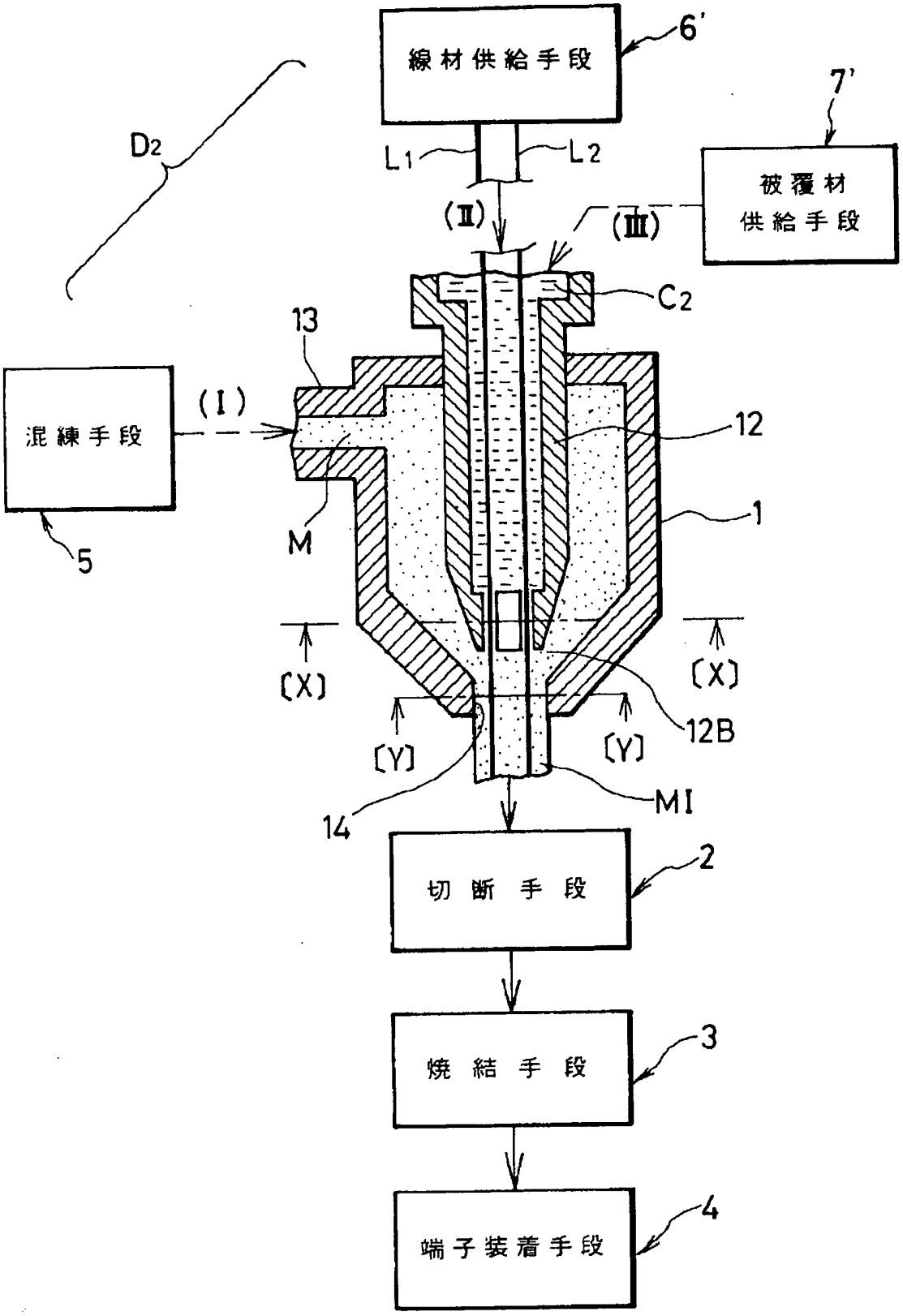
6
7
D1
L
(II)
被覆材
供給手段
(III)
C1
13
混練手段
(I)
12
1
M
5
11
12A
MI
14
CP
切断手段
2
焼結手段
3
端子装着手段
4

[Drawing 5]


線材供給手段
6'
7'
被覆材
供給手段
D2
L1
L2
(II)
(III)
C2
13
混練手段
(I)
5
12
1
M
〔X〕
〔X〕
〔Y〕
〔Y〕
12B
14
MI
切断手段
2
焼結手段
3
端子装着手段
4

[Translation done.]